

WHAT IS CLAIMED IS:

- 1 1. A method of forming a spin valve sensor, comprising:
2 forming a first pinned layer having a first magnetic orientation and a first
3 width;
4 forming a second pinned layer having a second magnetic orientation anti-
5 parallel to the first magnetic orientation; and
6 forming a sensing layer having a second width smaller than the first width.
- 1 2. The method according to Claim 1, further comprising forming a
2 coupling layer disposed between the first and second pinned layers.
- 1 3. The method according to Claim 2, wherein the first and second pinned
2 layers are formed with substantially equal thickness.
- 1 4. The method according to Claim 3, wherein forming the first and
2 second pinned layers creates self-pinned magnetic orientations.
- 1 5. The method according to Claim 3, further comprising depositing an
2 anti-ferromagnetic material (AFM) adjacent to the first pinned layer, wherein a
3 thickness of the AFM creates exchange coupling between the AFM and the first
4 pinned layer.

1 6. The method according to Claim 1, wherein forming the sensing layer
2 includes:

3 forming a free layer having a third magnetic orientation orthogonal to
4 the first and second magnetic orientations;

5 forming a bias layer in proximity to the free layer having a fourth
6 magnetic orientation anti-parallel to the third magnetic orientation; and

7 forming an AFM layer adjacent to the bias layer, wherein exchange
8 coupling between the AFM layer and the bias layer sets the fourth magnetic
9 orientation.

1 7. The method according to Claim 6, wherein the bias layer is formed
2 with a thickness greater than a thickness of the free layer.

1 8. The method according to Claim 1, wherein the second pinned layer is
2 formed with a width substantially equal to the second width.

1 9. The method according to Claim 8, wherein insulating layers are
2 disposed on both sides of the second pinned layer.

1 10. The method according to Claim 1, wherein the second pinned layer is
2 formed with a width substantially equal to the first width.

1 11. The method according to Claim 1, wherein insulating layers are
2 disposed on both sides of the sensing layer.